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A FACTORIAL STUDY OF TESTS OF RIGIDITY[1]

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The Nature of the Problem

The term "rigidity" is at present used with a wide variety of meanings, and failure to distinguish clearly one meaning from another has given rise to some confusion in current psychological writing. If progress is to be made in the exploration of the "rigidity" concept, it follows from an appreciation of the nature of scientific methodology, that operational meanings must be assigned to the term. This involves the development of tests which on *a priori* considerations may be thought to be measures of "rigidity." By "*a priori* considerations," we mean a postulated theory, possibly of a rudimentary kind, about the nature of rigidity which clearly delimits the class of operations that may appropriately be used in its exploration. By way of example, we may postulate that the persistence of an individual in a form of behaviour which is non-adaptive in a given situation results from the negative transfer effects of prior learning. Such negative transfer effects cannot be directly experienced but can only be inferred from certain observational or experimental data. If we regard rigidity in such terms as these, then clearly the operations, the testing situation, selected for its exploration must be of a kind that on inspection appear to be capable of defining individual differences in such negative transfer effects. The next stage of inquiry involves the study of such tests by methods which enable us to ascertain whether or not they do define a property of behaviour that can be differentiated unambiguously from the properties of behaviour defined by other commonly used tests. Factorial analysis is the best method available to the psychologist at present by which this can be done.

The purpose of the present investigation was to construct, and study by factorial methods, a number of tests which on *a priori* grounds were thought to differentiate individuals with respect to a property of behaviour which might for convenience be referred to as "rigidity." It is not our purpose here to elaborate on the history of the rigidity concept, or to discuss the theoretical issues which figure prominently in current

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controversy. These topics have been dealt with by Cattell (1, 2) and other writers. A brief statement, however, of the prior lines of thought which served as a guide in the development of tests is appropriate.

Historically, the rigidity concept stems from the work of Neisser, Gross, Heymans, Wiersma, and the psychologists of the Spearman school. These investigators used the term perseveration. More recently the concept has been elaborated and enriched not only by the followers of Spearman, but also by Gestalt oriented psychologists including Wertheimer (12), Duncker (4), Lewin (5), Luchins (6), and many others. These investigators used such terms as "rigidity," "gestaltbindung," "heterogeneous functional fixedness," "mechanization," and the like. While these terms are assigned meanings which are different from the meaning which was originally assigned to the term perseveration, it is clear that these investigators were concerned with phenomena of the same class as the workers of the Dutch and Spearman schools. Further, we find work on "habit-interference" which is directly related to the same field of inquiry. Some possibility exists that the recent and highly interesting work of Thurstone (8, 9) on speed and flexibility of closure may be related to the same class of phenomena.

The general idea underlying the work of many of these investigators is that prior experience of a given class produces a change of state in the organism, which persists, and restricts, inhibits, or otherwise delimits subsequent behaviour of a related class. This means that the existence of an organized behaviour pattern, organized on the basis of prior experience, interferes with and inhibits in some way forms of activity which demand some reorganization of the original behaviour pattern. Individuals are thought to differ markedly in this ability for behavioural reorganization. In so far as they differ they may be spoken of as more or less "rigid," more or less "flexible," and the like.

The workers of the Dutch and Spearman schools used in their investigations tests which may be classified as largely of the sensory and motor types. The Gestalt oriented psychologists were concerned with the phenomena at the perceptual or ideational levels, although few if any adequate tests designed to operationally define the concept were developed by them. They were concerned primarily with the phenomena themselves, and the variables which might be thought to affect them, rather than with the development of instruments which would facilitate subsequent investigation. More recently attempts have been made by Luchins (7) to develop testing situations at the cognitive and ideational level by which the rigidity concept might be studied operationally. It is clear, however, that the phenomena of this class may be studied at various levels of mental functioning, and that tests of rigidity at various levels

can be developed. It is further possible to extend the concept generally and to speak of emotional rigidity, rigidity of attitudes, interests and the like. It cannot, however, be assumed that any relation exists between rigidity at one level and rigidity at another level of mental functioning. This is a problem which can only be dealt with experimentally, and such experimentation will not be possible until more adequate testing situations are available at the various levels.

In the search for tests to investigate these phenomena, it is possible to distinguish clearly between tasks which demand the reorganization of a culturally induced behaviour pattern, and tasks which demand the reorganization of a behaviour pattern which is experimentally induced. This distinction was first made by Walker, Staines, and Kenna (11), and has been discussed by Cattell (1, 2). To illustrate, in our culture the majority of educated individuals can perform with some facility tasks involving the use of ordinary arithmetical operations. This represents a behaviour pattern which has been reinforced over a prolonged period of time. It is overlearned: it may be said to have attained a high level of habit strength. If now we require an individual to perform tasks which involve changes in the ordinary rules of arithmetic, he may experience considerable difficulty because of the interfering effects of the highly habituated behaviour pattern. On the other hand it is possible to organize a behaviour pattern immediately prior to or within the framework of the test situation itself, and this pattern may exert an interfering effect on the performance of tasks of a certain class. Here the behaviour pattern is experimentally induced. The tests used by Luchins (6) to investigate the so-called Einstellung effect are of this kind. At the present stage of inquiry it is important to keep this distinction clearly in mind, because there exists no experimental evidence to indicate either the presence or the absence of a relationship between rigidity defined in terms of the interfering effects of a culturally induced behaviour pattern, and rigidity defined in terms of the interfering effects of an experimentally induced behaviour pattern.

In the present investigation we are concerned exclusively with the development and analysis of tests which on *a priori* grounds appear to measure the interfering effects of culturally induced behaviour patterns, and with tests involving largely cognitive, ideational, or problem-solving processes as distinct from tests involving sensory, motor, or perceptual processes. It is recognized that this distinction is fairly arbitrary. Previous investigations of this type have been concerned to a considerable extent with the attempt to identify a rigidity factor at the motor level. One of the essential differences between this and previous investigations of this class is that we are here concerned with non-motor processes. We propose

to refer to these tests as tests of rigidity. We are fully aware that the term may quite justifiably be used with a wide variety of other meanings.

Description of Tests

Five tests which were thought to measure rigidity on the basis of the prior considerations discussed were constructed. Further, to ascertain whether these tests involved factors which were not represented in commonly used tests of mental ability, three tests drawn from Thurstone's 1947 College Edition of the American Council on Education Examination were included in the battery. These tests were Figure Analogies, Same-Opposites, and Number Series. Some speculations had been advanced on a possible relationship between rigidity and a factor isolated by Thurstone (8, 9) and tentatively named flexibility of closure. This factor was found by him to be significantly represented in the Gottschaldt Figures Test. Thurstone's revision of this test was included. In addition it was felt that certain tentative observations might be made regarding the relationship between the interfering effects of culturally induced and experimentally induced behaviour patterns. The Numerical Problems Test used by Luchins (6) in studying mechanization in problem solving was, therefore, added to the battery.

The following is a description of the tests which were thought to be measures of rigidity.

Test 1 - Arithmetic

This test consisted of 60 simple arithmetic problems involving the addition, subtraction, multiplication, and division of simple digits. In no case were more than four digits involved in a single problem. The subject's instructions were that for the purpose of this test a plus sign meant subtract, a minus sign meant add, a multiplication sign meant divide, and a divide sign meant multiply, the different operations being performed in the sequence in which they occur in the problem. Sample items are:

$$5 + 3 =$$
$$3 \times 3 - 1 =$$
$$7 \div 9 + 3 \times 2 =$$

The correct answers are 2, 2, and 30. The time limit was five minutes.

Test 2 - Mirrored Words

The instructions were: "This is a test to see how rapidly you can rewrite a list of words which have been written backwards. You must

read them from right to left and then rewrite them in the ordinary way." Sample items are:

NOITIDNOC ——————————
ETIRWER ——————————
TAEFED ——————————

The test consisted of 68 items. The time limit was five minutes.

Test 3 - Alphabet Test

The subject was asked to write the letter of the alphabet which came 2, 3, or 4 before the one listed, depending on the number written after the letter. For example, M - 3 signifies that the subject must write the letter in the alphabet that is three letters before M. This letter is J. Sample items are: P - 3, D - 2, J - 4. The answers are M, B, and F respectively. The test consisted of 52 items. The time limit was five minutes.

Test 4 - Word Construction

The instructions were: "This test consists of a number of words, and you are asked to rearrange the letters of each word and, with the addition of another letter or letters, make another word. Consider the following example:

TAG O ANIMAL GOAT

Here you are required to rearrange the letters T, A, and G in the word TAG and combine them with the letter O to make the name of an animal. The answer is 'goat' and is written in the space provided.

"Try these:

TREE P BOY'S NAME ——————————
TACK EJ ARTICLE OF CLOTHING ——————————
CHASM TO PART OF THE BODY ——————————

The answers are 'Peter', 'jacket', and 'stomach' respectively." The test consisted of 34 items. The time limit was five minutes.

Test 5 - Opposites

The instructions were: "This is a test in which you are asked to associate a season of the year with a month of the year. The four months used in the test and the seasons to which they of course refer are as follows: January (Winter), August (Summer), October (Autumn), April (Spring). In this test you will sometimes be asked to reverse the seasons in such a way that Summer = Winter, Winter = Summer, Spring = Autumn, and Autumn = Spring. This reversal takes place when the month is printed in small letters. When it is printed in capitals then the ordinary, unchanged associations should be made. For instance, the

season that goes with 'april' is not Spring but Autumn, because the month is written in small letters. If it had been written 'APRIL' then Spring would have been the correct answer." Examples are:

october ——————————
AUGUST ——————————
OCTOBER ——————————

The answers are Spring, Summer, and Autumn respectively. The test consisted of 90 items. The time limit was five minutes.

Test 6 - Figure Analogies, Test 7 - Same-Opposites, Test 8 - Number Series, and *Test 9 - the Thurstone revision of the Gottschaldt Figures,* are well known and do not require description here.

Test 10 - Numerical Problems

This test was designed by Luchins (6), and consisted of fourteen arithmetical problems. Using three jars (hypothetically) of a defined size as measuring instruments, the subject was required to determine how to arrive at a certain specified amount of water. The three jars were designated A, B, and C. Thus, to illustrate, if jar A held 21 units, jar B 127 units, and jar C 3 units, the subject was required to determine how to get exactly 100 units of water. This problem can be readily solved by the formula B−A−2C. The problems were written individually on the blackboard, and the subjects copied them into a prepared booklet. In each case the instruction was to solve the problem as rapidly as possible. One and one-half minutes were allowed for each problem. Two initial practice problems were used. The next four problems could be solved by the same method, called the E or Einstellung method. The formula B−A−2C solved all the Einstellung problems. To discover whether the subject had developed a set, an additional four problems, called the Critical problems, were presented. These could be solved either by the B−A−2C method, or more directly by A−C or C alone; that is, a more straightforward solution was possible. The question was whether the experimentally induced set of B−A−2C would "blind" the subject to the more straightforward solution. These problems were followed by four "Extinction" problems in which the B−A−2C method was inadequate for solution. The test was scored from 0 to 8 depending on how many of the Critical and Extinction problems were answered by the subject in the direct or "non-einstellung" manner.

The Sample and the Administration of Tests

The test battery was administered to six groups of McGill University students. In all, 98 subjects were tested, 69 men and 29 women. The

average age of the subjects was nineteen years, three months. The tests were administered to each group under uniform conditions of order, timing, and so on. Motivation among all subjects appeared to be fairly high. The total time of testing was two and one-half hours, and all tests were administered in a single testing session.

The Analysis of Results

The raw or obtained scores on all tests were transformed into normalized standard scores to eliminate any possible effects which differences in the shapes of the marginal distributions might have on the correlation coefficients. The normalized scores were punched on I. B. M. cards and the sums of squares and cross products determined by machine methods. The intercorrelations between the ten tests are shown in Table I.

TABLE I

Intercorrelations Between Tests

	1	2	3	4	5	6	7	8	9	10
1		.158	.396	.204	.232	.311	.006	.109	−.040	.015
2			.256	.280	.143	.153	.184	.141	.064	.038
3				.496	.187	.315	.114	.387	.159	.216
4					.141	.190	.375	.280	.221	.209
5						.222	−.006	.109	−.094	.009
6							.209	.495	.477	.262
7								.241	.213	.178
8									.342	.354
9										.245
10										

The correlation matrix was analyzed factorially using Thurstone's centroid method. Two analyses were carried out, the first analysis using the loading in each row or column as the estimated communality, and the second analysis using the communalities obtained from the first factoring as the diagonal entries. Three factors were extracted. The third factor residuals were checked by the criteria of both Coombs (3) and Tucker (10). Finding them in accord we were reasonably satisfied that further factoring would produce nothing of any significance. The centroid factor matrix, F, is shown in Table II.

The factors were rotated into an oblique simple structure using Thurstone's method of extended vectors. The oblique factor matrix, V, is shown likewise in Table II. The three factors are designated A, B, and

TABLE II

CENTROID AND ROTATED FACTOR LOADINGS

No.	Test	Centroid Factor Matrix			Rotated Factor Matrix*		
		I	II	III	A	B	C
1	Arithmetic Test	.373	.390	−.265	−.017	*.525*	.034
2	Mirrored Words	.349	.213	.183	−.042	.075	*.362*
3	Alphabet Test	.642	.300	−.059	.126	*.425*	*.297*
4	Word Construction	.616	.191	.333	.066	.048	*.595*
5	Opposites Test	.238	.261	−.193	−.013	*.380*	.004
6	Figure Analogies	.669	−.217	.219	*.450*	−.005	*.401*
7	Same-Opposites	.393	−.147	−.390	*.453*	*.415*	−.220
8	Number Series	.625	−.266	.173	*.480*	−.005	*.329*
9	Gottschaldt Figures	.426	−.468	−.060	*.610*	.025	−.013
10	Numerical Problems	.377	−.258	.060	*.381*	−.008	.132

*Rotated factor loadings to which some significance is attached are italicized.

C, respectively. The transformation matrix A, and the correlations between factors, *Rpq*, are shown in Table III. An examination of the rotated factor matrix indicates clearly that an overdetermined simple structure has been obtained.

TABLE III

Transformation Matrix A

	A	B	C
I	.530	.395	.408
II	−.779	.411	.286
III	−.335	−.822	.867

Correlations between Factors R_{pq}

	A	B	C
A	1.000		
B	−.042	1.000	
C	.253	.409	1.000

INTERPRETATION OF FACTORS

Factors A and C cannot in any sense be regarded as "pure" factors. This circumstance results because a sufficient number of tests of the right type were not incorporated in the battery to enable the isolation of three factors which could be regarded as "pure."

Factor A is observed to have zero loadings on all tests which were thought on the basis of preliminary analysis to be tests of rigidity, and significant loadings on Figure Analogies, Same-Opposites, Number Series, Gottschaldt Figures, and Numerical Problems. A loading greater than

.25 is regarded here as significant. This figure is arbitrary. It may be inferred that a fairly large reasoning component is involved in this factor. Gottschaldt Figures has the highest loading on this factor, a result which is somewhat unusual. Work by Thurstone (8), however, indicates that a fairly large reasoning factor is involved in this test, a fact which in part at least explains the results observed.

Factor B can be identified clearly as a rigidity factor, although it may be more appropriate to speak of it as a habit-interference factor. This factor has significant loadings on the Arithmetic Test, Alphabet Test, Opposites Test, and on Same-Opposites. Analysis of the first three of these tests shows clearly that they all involve tasks which are performed against the interfering effects of culturally induced modes of behaviour. The Mirrored Words Test and the Word Construction Test, which were initially thought to involve this factor, are found not to be tests of rigidity. Both have zero loadings on this factor. A more thorough analysis of the nature of the tasks involved in these tests might have anticipated this result. If the Mirrored Words Test does involve a rigidity component, it is of the perceptual rather than the cognitive or ideational type. In the Word Construction Test the subject is required to rearrange the letters in a word together with certain additional letters to form another word of a specified class. Since the original letters given formed a word in themselves it was thought that this would interfere with the facility with which the rearrangement could occur. If any interfering effects are operating in this test they are negligible in relation to other factors which are involved. The Same-Opposites Test of the 1947 A. C. E. Examination has a significant loading in the rigidity factor. Again an analysis of the nature of the tasks comprising this test makes this finding plausible.

Factor C is observed to have significant loadings on the Mirrored Words Test, the Alphabet Test, the Word Construction Test, Figure Analogies, and Number Series. This factor is in no sense a pure factor, and as a consequence interpretation is difficult. No interpretation will be attempted here.

It would appear highly desirable in short studies of this kind to include a sufficient number of tests of known factorial content to enable the unambiguous identification of those factors which are included for control purposes, but are themselves not the primary object of the inquiry. Regardless, however, of the psychological significance which may be attached to factors A and C, the general conclusion is that we have succeeded in isolating a factor which can be unambiguously identified as a rigidity or habit-interference factor.

There is no evidence from this study that any relationship exists between the interfering effects of culturally induced and experimentally

induced behaviour patterns. Luchins' Numerical Problems Test has a positive loading on factor A and a zero loading on the rigidity factor. Further, the correlation between these two factors is approximately zero. We can conclude very little about the factorial content of the Numerical Problems Test, since the study was not designed for this purpose. It is quite possible that another rigidity factor can be isolated in tests involving the interfering effects of experimentally induced behaviour patterns, which may or may not be correlated with the rigidity factor found in this study. We propose to investigate this problem.

Summary and Conclusions

For purposes of this study, rigidity is considered in terms of the interfering effects of culturally induced behaviour patterns. Five tests were constructed which, on the basis of theoretical considerations, were thought to involve rigidity so regarded. These tests were incorporated in a battery together with five additional tests, and subjected to operational analysis using factorial methods. Factorial analysis resulted in three factors which were rotated into an overdetermined oblique simple structure. One of the factors can be identified unambiguously as a rigidity or habit-interference factor.

In conclusion it is observed that we have explored in this study a very restricted aspect of the rigidity concept. Considerable work is required, following the general pattern of this study, on the relation between the interfering effects of culturally and experimentally induced behaviour patterns. In addition, work is required on the relation between rigidity, defined in either of these terms, at various levels of mental functioning, sensory, motor, perceptual, and cognitive or ideational.

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THE PSYCHOLOGY OF RELIGION AFTER FIFTY YEARS[1]

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In the psychology of the present day, the study of religion occupies so modest a place that the appearance of two works of major importance in the field is a noteworthy event. Perhaps some reflections suggested by the reading of Gordon Allport's *The Individual and his Religion* (1) and Oscar Pfister's *Christianity and Fear* (5) may be allowed to furnish the occasion and serve as the pretext for a reconsideration of some of the problems that concern the relations between religion and psychological study in our own day.

The psychological investigation of religion in America, beginning about 1900 with Starbuck's studies of conversion and James's famous classic, ran a fairly lively course of productive activity during the first quarter of the century. But since then, interest and output have steadily declined, until today it would not perhaps be untrue to say that the subject is regarded by many psychologists with almost complete indifference, and by some with positive suspicion and even disfavour. Why should a form of human experience so patently universal, so clearly central and pervasive within the personality of the individual, have incurred the *odium psychologicum*?

Allport (1, p. 1) shows that:

> During the last fifty years religion and sex seem to have reversed their positions. Writing in the Victorian age William James could bring himself to devote barely two pages to the rôle of sex in human life which he labelled euphemistically "the instinct of love." Yet no taboos held him back from directing the torrent of his genius into the *Varieties of Religious Experience*. On religion he spoke freely and with unexcelled brilliance. Today, by contrast, psychologists write with the frankness of Freud or Kinsey on the sexual passions of mankind, but blush and grow silent when the religious passions come into view. Scarcely any modern textbook writers in psychology devote as much as two shamefaced pages to the subject—even though religion, like sex, is an almost universal interest of the human race.

How true this is, some concrete examples will indicate. Ruch's *Psychology and Life*, in America the most widely read of all introductory textbooks in psychology—a delicate and sensitive thermometer that may be taken to register with great accuracy the temperature of the textbook market—makes one passing reference to religion as a possible source of racial prejudice and does not include the word in the index. On the other hand, he devotes many pages to such themes as "sex activity in

[1]The substance of a paper read at the meeting of the Maritime Psychological Association at Wolfville, Nova Scotia, in September, 1950.

children," "sex gland," "sex content in child's play," "sex maturity in rats," "premarital sex relations," "sexual appetite in the female," and "sex difficulties in adults." Munn, the next most popular author, simply does not mention religion at all, even as a possible source of racial prejudice. The reader of Guilford's or of Seashore's *Fields of Psychology* would conclude, from the absence of reference to it, that the psychology of religion is not one of the recognized areas of psychological study. In the 1929 edition of Gardner Murphy's *Historical Introduction to Modern Psychology*, the psychology of religion was given the same amount of space and prominence as social psychology. In the 1949 edition it is referred to only in the chapter devoted to William James, where two or three pages are given to James's *Varieties of Religious Experience*. The enormous *Handbook of Applied Psychology* by Fryer and Henry, which shows the relevance of psychology to almost every conceivable activity of Western man from engineering to librarianship, has nothing to say on man's religious activities. Intensive research, it is true, discovers a short section of two paragraphs headed "Theology," but this deals only with the selection and admission procedures of American theological colleges, which procedures are found to be in an undeveloped state. If anywhere in recent psychological literature, we might expect the hospitable and catholic pages of Gardner Murphy's *Personality* to make something of the role of religion in the formation and structure of the personality. The word occurs in the index, but the seven references to religion are so fleeting and trivial that one is almost inclined to wonder why it was thought desirable to index them at all. Again, we might think that recent personalistic phenomenology as represented by Snygg and Comb's *Individual Behaviour* would deal with the matter even at some length. But again the oracle is silent.

Why is this? The virtual exclusion of religion from the phenomenal field of the contemporary psychologist no doubt mirrors the decay of religion in the modern world. Our culture simply does not provide a soil favourable to the growth of an intense spiritual life. Our values are predominantly activist, extravert, separatist (whether individualist or totalitarian), positivist, secular, humanist; and the activities in which we excel are commercial, scientific, technological, and militarist. Cultural relativity is, however, no infallible indication of psychological adequacy, and we must be cautious in accepting the line of argument that asks us to believe that the psychology of religion has, and will have, just the place it deserves in the general psychological economy.

It is always easy, moreover, to exaggerate the irreligion of the age. Allport's study of the religion of Harvard and Radcliffe undergraduates indicates that only eighteen per cent stated positively that they felt no

need at all of religion for the attainment of a mature personality. It has been commonly thought that the teaching of science to the young is one of the principal reasons for the decay of religious belief. In his chapter on "The Nature of Doubt," Allport suggests that for the post-war generation quite the reverse may well turn out to be true. In the Victorian age of exuberant scientific rationalism, science had all the fun and all the glamour. For one thing, it came to young people after they had been subjected to what was perhaps a somewhat stern and dogmatic religious upbringing. It was exhilarating to discover that Darwinism showed that the account of creation in Genesis could not be literally true in detail, particularly if this discovery proved shocking to your parents. To accept the new view made you feel superior, enlightened, and in the vanguard. But today the situation is almost completely reversed. Now the young person begins with science and often knows next to nothing about religion. Religion, if it appears at all, appears against a scientific background. This gives it the advantage of the second thought, of the thing that comes after. For the young look about them and see the horror and the havoc that the undirected application of scientific knowledge to human affairs has brought to the modern world. They are familiar with the dreary, mechanical view of the universe, and of life and mind. They ask: "Can this indeed be all? How can this explain the behaviour of human beings and all their aspirations and misgivings?" Today, religion and not science may appear the emancipator of the intellect from the tyrannical authority of a stale and outworn dogmatism. Because science has failed so signally to answer such questions, religion is beginning to regain among sensitive and intelligent youth some of the glamour, excitement, and sense of adventure that so lately belonged to science. Familiarity with modern dynamic psychology may contribute to this. At least young people learn from psychology what human needs really are. They may visit the mental hospital or psychiatric clinic primarily to satisfy a youthful and perhaps vulgar curiosity, but what they see there, if it does not cause them to remain to pray, at least sobers the exuberance of their faith in material and technological progress as answers to the deeper needs of the human heart in its hour of shame or sorrow. Kant, in a moment of unusual poetry, found himself moved to wonder by the starry heavens above and the moral law within. Today, the revelations of the clinic and the hospital may bring home to us the mockery of any merely material conception of human security.

We know, also, how subtle is the influence of language. The novel language of psychology has unquestionably enabled many people to gain an entirely new understanding of themselves. But Allport (1, p. 84) asks:

Might young people brought up in the symbolism and faith of psychoanalysis, when confronted with life's perplexities, find the less familiar but more heroic expressions of the world's great religions fresh and insightful, and more germane to the totality of their experience?

"Perfect love casteth out fear." Compare with these brief words Allport's satirical translation, on another page, into the language of psychology, and judge which has the greater force: "The capacity of the Ego to ward off anxiety is enlarged if the Ego has considerable affection for his fellows and a positive goal to help them." I am reminded of the translation—not intended to be satirical—of Overstreet, in his widely read *The Mature Mind* (4, p. 104), of John 13:34 ("A new commandment I give unto you, That ye love one another"): "Develop enough emotional maturity to take the initiative in breaking the vicious circle of smiting and being smitten."

But I am far from suggesting that the decline of psychological interest in religion is entirely or even largely due to a general entertainment on the part of psychologists of a shallow positivism resulting in a narrow and dreary view of life; or to their employing a ponderous and half-barbarous language and so, with heavy hands stripping away, as so many errors and falsehoods, all the images and symbols by which religion indirectly, that is, in the only way it can, communicates its truths.

For it seems to many psychologists who would not wish to be thought outright positivists or operationalists that, once we admit religious data, we make a dangerous and reactionary concession to that philosophical, and theological, and deductive outlook that once dominated psychology, and to be free of which we have had to engage in a protracted and sometimes embittered struggle. People, they fear, will start talking about the soul or the freedom of the will or the relation of mind and matter, or how we can know other minds, or whether psychologists properly study mental acts or mental dispositions, or any number of other ancient chestnuts which to the empirically and inductively minded psychologist are either irrelevancies or semantic confusions. Certainly no science can be scientific if it must begin by accepting an ideology, whether theological or political, imposed upon it by external authority. Yet this wholesome dread of becoming involved in a *sacrificium intellectus* has in fact brought about a highly curious state of affairs in contemporary psychology: it has had the effect of reducing the psychological study of religion to a merely genetic status. It is perfectly legitimate to discuss the tribal ceremonies of the Zuñi Indians, or the religious delusions and mania of the psychopath, or the conversion experiences of our own adolescents, but to introduce the

religious behaviour of the normal, civilized American adult is clearly not permissible. Like Gibbon at Lausanne, we have decided to suspend our religious enquiries at the mature age of seventeen. The unspoken implication is that adult religion is the same kind of thing as primitive, psychopathic, or adolescent religion, irrationally and incongruously projected into a later stage of development. This is a transparent example of the reductive fallacy.

Religion is notoriously controversial. If you descend from amiable but nebulous generalities, such as that religion in general is in a general sort of way a good thing for people in general; if you scrutinize and particularize more closely, you are almost certain to offend the religious sensibilities of some of your readers or hearers. Moreover, the course of religious controversy is incalculable and unpredictable. Not only is it more embittered than scientific controversy; it is more likely to lead to loss of caste and status. Prudence counsels silence.

Terminology and methodology raise insuperable difficulties. Religious words are coloured with affect, with poetry, and with historical associations. It is impossible to translate them into scientific concepts. We demand terms that can be defined operationally, but religion is naively and obstinately objectivist and existentialist. While a few genuine attempts have been made to deal empirically and even experimentally with religious phenomena, it remains substantially true that the technique most frequently employed has been the questionnaire, a technique proverbially subject to all sorts of investigational errors. Nor from the nature of the case does it seem likely that better techniques will be evolved, for is it not notorious that once we regard religion psychologically or subjectively we instantly discover that there are as many religions as there are religious individuals—and can there be a science of individuals? "Understanding"-psychology, personalism, and phenomenology may assert that there can, but the matter is a difficult one and remains *sub judice*.

By its humanism, modern psychology is critical of religion, for it sees religion all too often as a factor in the production of morbid mental states. It is less common to find a Christian minister fully and urgently aware of this danger. In *Christianity and Fear*, Oscar Pfister (5, pp. 24, 505), a Protestant Swiss pastor and a Freudian psychoanalyst, examines the relation between religion and neurosis. While holding that Christian love ("absolute love of God, relative love of others and of self") is the supreme antidote to fear, guilt, and anxiety, and a powerful therapeutic force in the prevention and cure of the neuroses, Pfister draws on a wealth of historical and theological learning to illustrate the enormous

psychological harm done to innumerable individuals by the elements of neurotic fear that have crept into Christianity.

Measured against the principle laid down by Jesus, the history of Christianity has the appearance of a gigantic misunderstanding or of a pathology of Christianity . . . [Such pathological Christianity] becomes a dangerous source of fear; instead of a safeguard against neuroses it becomes a sinister focus; instead of a gracious force of divine love it becomes a breeding place for compulsive-neurotic and magic thoughts and actions, and a destruction of the free and healthy impulses given man to realize the eternal, moral will to love . . . Hence the dual problem of preserving and restoring the health of mankind through Christianity, and of maintaining in turn the health of Christianity rightly understood—both through a true discipleship of Jesus.

When confronted with the morbid scruples of conscience, the anxieties, compulsions, obsessions, dreads, and guilty feelings so often associated with religion, most religious writers retort that these are the exceptions rather than the rule and that we are confusing the psychology with the psychopathology of religion. In *Varieties of Religious Experience*, James noted and described these phenomena. But Pfister's book is altogether unique in the thoroughness of his search for the dynamic sources of these manifestations using the "inter-disciplinary approach" made possible by his unusual combination of historical and theological learning and psychological understanding (5, p. 24).

A loss of love which customarily occurs in non-religious compulsion neurotics must inevitably, in the religious, be accompanied by a great overemphasis on dogma, an overemphasis leading to the complete worship of dogma, with the result that frequently, and perhaps in most cases, Christianity ceased to be a religion of love and became a religion of fear—fear of dogmas accompanied by a fervid worship of dogma, while God ceased to be a loving father in Heaven and, particularly during the dark ages of Christian neuroticism, became a grim dogmatic, looking upon an error of dogma as a crime to be punished by the stake and eternal torment in hell, while He not only pardoned but actually demanded the most outrageous crimes against love, including the killing of witches and the most sanguinary wars of religion. The neurosis of individuals leads to a neurotic malformation of their Christian faith, and in certain circumstances must do so inevitably, and when this process is applied to the masses it necessarily affects entire churches, the Protestant as well as the Catholic. Conversely a neurotic perverted Christianity must induce neuroses in the individual and in the masses.

Hence, there is the need for a hygiene of religion based not only upon religious truth but upon psychiatric knowledge and psychological insight. While this is no doubt true and important, we may note in passing that Pfister seems to think that the only religious sources of anxiety arise from fear inspired by excessive veneration of dogma, and from magical dependence, for the sense of security, upon rites and ceremonies. He overlooks the inevitable anxiety, which is neither infantile nor

pathogenic that springs from the realization that human life is, from its nature, unavoidably tragic and that the full development of the person through love cannot be attained without conflict, sacrifice, risk, loss, insecurity, and pain.

Yet the psychology of religion is bound to be as unsatisfactory to the theologian as it is to the psychologist, for to find its origin in fear or sex or the unconscious, or to explain it away as an illusion, seems to equate religion with any other purely human experience. It shifts the centre of attention from the objective realities of religion to the subjective feelings of inner experience; it equates religion with a state of mind. But for the theologian worthy of the name, religion is not the enjoyment of religious feelings nor the development of human personality; it is "doing God's will, not how you feel about it." (2, pp. 134-5) The psychological or subjective approach is the product of a sceptical age that, having rejected all belief in God, finds interest only in discovering the genesis of the idea of God or in displaying the psychological functions that this (delusive) idea performs in the life-economy of the individual. If the value of religion is to be found exclusively in its psychological effects, is not religion being subtly turned into a kind of psychology? In view of the growing success of psychiatry in dealing with human troubles, will not people demand that the whole work of the *Seelsorge* pass into the hands of the psychiatrist? Indeed, in the popular estimation, is not the psychiatrist already the true priest of today with novel and unheard-of powers of loosing and binding? Can the time be far distant when they will seek to close the churches by act of parliament and install psychiatric clinics in their place? Yet, while the psychology of religion is accused of being too subjective in one direction, it is not subjective enough in another. For it overlooks the fact that religious truth is subjective truth, not fully realized until we act upon it by personally committing ourselves to it in an act of faith. So the psychologist of religion is apt to receive from the theologian, no less than from the scientific psychologist, more kicks than halfpence for his pains.

There remains, however, a more serious difficulty that brings us to the crux of the whole matter. Rightly or wrongly, psychologists have come to feel that nothing of *psychological* value can be extracted from the study of religion. Psychology may, indeed, be of great service to religion in making religious practices more efficacious. Theological students are commonly urged to undergo clinical training and to become pastoral psychologists. Fashionable apologetics defends religion by showing that it has many of the virtues of psychology. Prayer, an eminent pastoral psychologist (3, p. 18) reminds us, is an aid to surgery: "A trustful, calm, prayerful state of mind reduces blood-pressure and so prepares the

patient that anaesthesia is produced more readily." This the psychologist is fully prepared to believe, but he remains reluctant to admit that psychology has anything like this to gain from religion. For religious behaviour is, after all, simply behaviour, and religious experience is still experience. Empirical psychology will not reveal any new factor but will simply illustrate the same principles and concepts that the psychologist finds operative in all fields of human activity. It may be true that religion is often a powerful, or even as Allport claims, a unique factor in the structure of the personality. But, having said this, what more can the psychologist *qua* psychologist, say or do about it? What scope is there here for genuinely productive experimentation? So far as psychological theory is concerned it is the process that is of interest, not the medium in which it is brought about. Whether integration of personality is effected by devotion to religion or by devotion to greyhound-racing or basket-weaving is a matter of psychological indifference. In short, if religion is to be regarded in future as a province of serious psychological study, it must demonstrate that it contains something not only of unique psychological significance unobtainable elsewhere, but something that can be illuminated by empirical and inductive study and incorporated homogeneously in the general body of psychological truth. His position may or may not be well taken, but it is here that the psychologist's real difficulty lies. This is not to deny the enormously important role that religion may play in human life, nor the value of the ends proposed by religion, for the realization of which psychological knowledge may serve as a valuable instrument, nor that priest and clinical psychologist or psychiatrist may fruitfully collaborate in the therapy of individual cases. It is only to suggest that neither theology nor psychological theory, as at present understood, seems likely to gain deeply from the attempt to apply the empirical operations of psychology to the phenomena of religion.

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THE NET OF RECIPROCAL INFLUENCE

Study II: The Balance of Power[1]

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I

In an earlier article,[2] attention was directed to the problem of scoring sociometric matrices in such a way that they would "properly" reflect the relative "influence," "popularity," or "status"[3] of each subject. It was there submitted that one such "proper" solution would weight the choices made by each child in proportion to his own score as an object of choice. It was demonstrated that this could be done by solving a set of simultaneous equations of the following form:

$$\begin{aligned} a + b + c \ldots\ldots\ldots\ldots\ldots\ldots + k &= 1 \\ -ma + x_{ba}b + x_{ca}c + x_{da}d \ldots\ldots\ldots + x_{ka}k &= 0 \\ x_{ab}a - mb + x_{cb}c + x_{db}d \ldots\ldots\ldots + x_{kb}k &= 0 \\ \vdots \qquad\qquad \vdots & \\ x_{ak}a + x_{bk}b + x_{ck}c + x_{dk}d \ldots\ldots\ldots - mk &= 0 \end{aligned}$$

Where $a, b, c, d \ldots . k$, represent the sought-for relative popularities respectively of subjects A, B, C, D . . . . K,
where m represents the number of choices or total weight of choice allowed each individual, and
where x_{ab} represents the number signifying the choice given by A to B,
x_{ba} " " " " " " " " " B to A, etc.

This note is intended less to expand the mathematical properties of such a system, and rather more to examining, with its aid, one formal social property of such a system.

II

Let us hypothesize a small group of, say, five people rating one another, or choosing one another with reference to one, perhaps very general, criterion—say "Whom would you most like to have for a

[1]This article, like the preceding one, arose out of some problems posed in a particular situation in a particular community.

[2]John R. Seeley, "The Net of Reciprocal Influence: A Problem in Treating Sociometric Data" (*Canadian Journal of Psychology*, 3, 1949, 234-40).

[3]The whole problem of the relation between "status" and such choices will be the subject of a later article.

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friend?" Each subject is permitted (or, rather, compelled) to make two choices—to place a 2 beside the name of the person he would most like, and a 1 beside the name of the person he would next most like. A possible resultant matrix of choices might be the following:

MATRIX I

Subject chosen / Subject choosing	A	B	C	D	E	Σ
A	·	2	1	0	0	3
B	2	·	1	0	0	3
C	2	1	·	0	0	3
D	2	0	1	·	0	3
E	2	0	0	1	·	3
Σ	8	3	3	1	0	15

Matrix I represents, according to Northway,[4] a probably "typical" situation, empirically, in which A and B having given one another "reciprocal first choices" and been chosen also by C (who received *their* second choices) are the "stars of the class," and tend to be chosen by the less popular children. Empirically "typical" or not (and we suspect it is), the formal properties of the system are worth examining.

Solution of the matrix, according to the designated procedure, yields the following values:

$$a = \frac{504}{1260} = .400$$

$$b = \frac{441}{1260} = .350$$

$$c = \frac{315}{1260} = .250$$

$$d = .000$$

$$e = .000$$

The first thing to observe is that, although E has given D a second-choice vote, and D has given his second-choice vote to C—and therefore

[4]Mary L. Northway, Esther B. Frankel, and Reva Potashin, *Personality and Sociometric Status* (Boston: Beacon House, 1947).

neither has behaved as a perfect "star-gazer"—in spite of this, according to this form of solution the influence of D and E on the group, with reference to this function, is nil. The result is unaltered if they become perfect "star-gazers" and give their votes to A and B, thus:

MATRIX II

Subject choosing \ Subject chosen	A	B	C	D	E	Σ
A	·	2	1	0	0	3
B	2	·	1	0	0	3
C	2	1	·	0	0	3
D	2	1	0	·	0	3
E	2	1	0	0	·	3
Σ	8	5	2	0	0	15

It is of interest to note here that, although B has a total vote of two more, and C and D a total of one less, each, the standings of all are unaffected. The addition or subtraction of the "ineffective" or "worthless" votes of D and E affects no one. It is, perhaps, more remarkable, however, that if D and E revolt against this situation and give their first votes to each other, and their second votes to the least stellar of the remainder, namely C, the situation is still unaffected for anyone, thus:

MATRIX III

Subject choosing \ Subject chosen	A	B	C	D	E	Σ
A	·	2	1	0	0	3
B	2	·	1	0	0	3
C	2	1	·	0	0	3
D	0	0	1	·	2	3
E	0	0	1	2	·	3
Σ	4	3	4	2	2	15

Again, despite obvious changes in the vote-totals, A, B. C, D, E maintain the same relative influence.

What seems to be established, so far, is that, in such a situation (if the analytic form is correct) nothing that D and E can do, by way of redistributing their votes will, by itself, affect the "balance-of-power." While, therefore, their choosing one another in their powerlessness may be recommended on many other grounds, it cannot be sufficient to affect the influence they exert (as defined here).

Moreover, the crucial role played by C in matrix III is at once evident. He can, in effect, not only be a "king-maker" but can reverse the entire influence-structure. If he should cast his choice for D and E instead of for A and B, the matrix would stand thus:

MATRIX IV

Subject chosen / Subject choosing	A	B	C	D	E	Σ
A	·	2	1	0	0	3
B	2	·	1	0	0	3
C	0	0	·	1	2	3
D	0	0	1	·	2	3
E	0	0	1	2	·	3
Σ	2	2	4	3	4	15

The solution of the matrix yields the following, the polar opposite of situations I to III:

$$a = .000$$
$$b = .000$$
$$c = .250$$
$$d = .350$$
$$e = .400$$

It should be particularly noted that, in this situation, C's shift of allegiance has cost him nothing. His status is the same as before.[5]

[5]It should be pointed out that this, and every other statement in the article, holds only within the postulated frame of reference. A "democratic" system might here make C the leader. This merely points up the possible tension in a situation where formal, democratic procedures make C the leader, *if* informal judgments are made on the basis postulated.

Moreover, in dynamic terms, it can cost C nothing, for even if A and B, alienated from him, give their first choices elsewhere, the effect is nil, since their votes are (in virtue of C's shift) nihilized in their effect. C is thus, in this situation and in number III, the perfect "power behind the throne." (What could happen if A, B, D, and E, aware of this, acted to change the situation, may readily be explored.)

If, on the other hand, C decides to distribute his "influence" as between the two "cliques," one or other of the two following distributions results:

MATRIX V

	A	B	C	D	E	Σ
A	·	2	1	0	0	3
B	2	·	1	0	0	3
C	0	2	·	1	0	3
D	0	0	1	·	2	3
E	0	0	1	2	·	3
Σ	2	4	4	3	2	15

MATRIX VI

	A	B	C	D	E	Σ
A	·	2	1	0	0	3
B	2	·	1	0	0	3
C	0	1	·	2	0	3
D	0	0	1	·	2	3
E	0	0	1	2	·	3
Σ	2	3	4	4	2	15

The solutions follow:

V

$$a = \frac{252}{1260} = .200$$

$$b = \frac{378}{1260} = .300$$

$$c = \frac{315}{1260} = .250$$

$$d = \frac{189}{1260} = .150$$

$$e = \frac{126}{1260} = .100$$

VI

$$a = \frac{126}{1260} = .100$$

$$b = \frac{189}{1260} = .150$$

$$c = \frac{315}{1260} = .250$$

$$d = \frac{378}{1260} = .300$$

$$e = \frac{252}{1260} = .200$$

Again it will be noted that C suffers no diminution of status as between the two possibilities, or as against situations I-III. His crucial role is, however, even more dramatically illustrated since the minor difference (between his first and second preference) is capable of upending the entire structure.

Let us now examine C's "power" in relation to the degree to which D and E manifest the star-adulant behaviour referred to by Northway.

Perfect "star-adulation"

It will be recalled that matrix II showed an example of perfect star-adulation as defined—that is, "knowing" how A and B have voted (for A, B, and C in that order), C, D and E give their votes to A and B in the same order of preference. If in this situation C reverses himself, he gives his choices to D and E, and either one of the two following matrices results:

MATRIX VII

Subject choosing \ Subject chosen	A	B	C	D	E	Σ
A	·	2	1	0	0	3
B	2	·	1	0	0	3
C	0	0	·	1	2	3
D	2	1	0	·	0	3
E	2	1	0	0	·	3
Σ	6	4	2	1	2	15

MATRIX VIII

Subject choosing \ Subject chosen	A	B	C	D	E	Σ
A	·	2	1	0	0	3
B	2	·	1	0	0	3
C	0	0	·	2	1	3
D	2	1	0	·	0	3
E	2	1	0	0	·	3
Σ	6	4	2	2	1	15

The solutions of these matrices (and that of matrix II, for comparison) follow:

Influence \ Situation	Matrix VII	Matrix VIII	Matrix II
a =	.320	.320	.400
b =	.280	.280	.350
c =	.200	.200	.250
d =	.067	.133	.000
e =	.133	.067	.000

It will be seen that where star-adulatory behaviour is perfect, C's power is limited to a 20 per cent reduction of the power of A and B. It will also be noted that his shift also costs him 20 per cent of his own power because it reduces the power of his supporters. Moreover, he cannot alter the situation sufficiently to eliminate the dominance of A over B, C, D, E; of B over C, D, E; or of himself over D or E. He can, of course, select whether D or E is to occupy the lowest rank.

No "star-adulation"

Where "star-adulation" is entirely absent, as in matrix III—that is, where D and E give their first choices to one another, and their second choices to the otherwise-weakest (that is, to C)—C's power has already been discussed. He can, without affecting his own status, take away all of the influence of A and B, and redistribute it to D and E, or he can cause a partial redistribution by "splitting" his influence.[6]

Influence \ Situation	III	IV	V	VI
a =	.400	.000	.200	.100
b =	.350	.000	.300	.150
c =	.250	.250	.250	.250
d =	.000	.350	.150	.300
e =	.000	.400	.100	.200

Imperfect "star-adulation"

Matrix I is a form of "imperfect star-adulation," where D and E do give their first votes to the otherwise-most-influential, but do not give their second votes to the next-most-influential. If C reverses his influence-distribution in matrix I, the following matrix results:

MATRIX IX

Subject choosing \ Subject chosen	A	B	C	D	E	Σ
A	·	2	1	0	0	3
B	2	·	1	0	0	3
C	0	0	·	1	2	3
D	2	0	1	·	0	3
E	2	0	0	1	·	3
Σ	6	2	3	2	2	15

[6]C can also procure other arrangements of IV, V, and VI by giving, respectively, his first choice to D instead of E and his second to E; his first to A instead of B and/or his second to E instead of D; and his first to E instead of D and/or his second to A instead of B. The argument, however, is unaffected and not all these possibilities are explored here.

The solution of matrix IX, and, for comparison, matrix I, is shown below:

Influence \ Situation	I	IX
a =	.400	.314
b =	.350	.210
c =	.250	.214
d =	.000	.119
e =	.000	.143

Matrix I is, of course, only one special case of imperfect adulation, but it can be shown that the following properties will hold for the variations:

I Where adulation is perfect:
- (a) C can secure moderate diminutions of the influence of A and B and moderate increases of that of D and E.
- (b) C loses some of his own influence in effecting the change.
- (c) C does not affect the rank order of influence.

II Where adulation is imperfect:
- (a) C can secure larger diminutions in the influence of A and B, and larger increases in that of D and E.
- (b) The influence-costs to C are less.
- (c) The rank order of influence may be affected.

III Where adulation is zero:
- (a) C can totally diminish the influence of A and B and redistribute it to D and E.
- (b) The cost to C is nil.
- (c) The influence-structure may be totally reversed.

III

A mathematical solution was provided in an earlier article for the problems posed by an ideal-typical system of influence, where every vote cast was weighted according to the weighted total of votes received. It was hypothesized that there are situations where this is the best-fitting solution to what is going on empirically.

This paper, still at the analytical level, examines some properties of a simplified "society" whose formal properties are those described.

It points first (situations I, II, III) to the powerlessness of the powerless (under the given conditions) to affect their own power.

It points next to the crucial role of the least powerful of those who have any power at all (C).

It points next to the limitations on the power of the "middleman" (C) to affect the distribution of influence—limitations imposed by the behaviour of "the powerless" toward one another. To the degree that they embrace one another, instead of the already-powerful, they enhance C's capacity to redistribute influence to them, partially or (with him) exclusively.

These are merely formal and necessary properties of the system as conceived, and its other properties and its relation to the real world remain to be explored. As to the latter, it gives, at least, a formal model which might be used to give precise meaning to such terms as "middleman," "power-behind-the-throne," "manipulator," "operator," "ward-heeler," etc. It also remains to explore the consequences to the properties of the system as one after another of the restrictions (imposed as the abstraction proceeded from the empirical level) is removed. What happens when more than one group, more than one function in each group, variation in the total choices allowed individuals, overlapping and unequal membership, etc., are permitted?

It is felt that these questions have more significance than is given them in their character as an exercise in logic. We need—badly need—in the social sciences formal models with known properties that will serve as norms, approximation to which or deviation from which, appropriately measured, can be used to replace our present, large, loose, qualitative characterizations of the situations we purport to describe.

THE RELATION OF EXPERIENCE TO THE DEVELOPMENT OF HUNGER[1]

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It has long been assumed that hunger is innately organized so that the animal which has a physiological need of food for the first time will eat at once when food is available. Actually, there is little direct evidence on this point. Bash, while stressing some of the learned aspects of hunger, implies that this drive is innately organized when he says that "the hunger drive must operate through some non-cerebral reflex mechanism" (1, p. 146). Young (8) concludes that specific hungers are learned, but has not made his position clear with respect to general hunger. Hebb (3) has reported a preliminary experiment which appears to show that non-specific hunger is learned. This interpretation is consistent with the observation of several writers (2, 4, 5, 6) that their animals did not begin to eat as soon as food was available on the first day after deprivation. The experimental data on the relationship between food deprivation and hunger are still inadequate, however, and it would seem desirable to obtain further information.

Since the meaning of "hunger" may be ambiguous, for the purposes of this experiment it will be defined as the tendency to seek and eat food. The problem, then, is to determine whether deprivation automatically arouses hunger in the naive animal. First, one may ask whether the animal immediately selects the appropriate object; that is, does deprivation prime the animal to respond to the relevant stimulus? Secondly, does the animal make up his nutritional deficit: is the maintenance of eating determined by physiological need? Thirdly, if the animal does not adequately compensate for his physiological lack, is there any change in behaviour with continued testing; in other words, does learning occur?

Procedure

Forty hooded rats, weaned at 21 days, were placed with their litter mates in a cage with a plentiful supply of Purina Fox Chow pellets and water, and moist Purina mash for the first few days after weaning. In addition, the animals were fed small pieces of fresh vegetables twice a week. The animals were habituated to individual home cages for from 48 to 72 hours before testing was begun.

The test groups are outlined in Table I. All but three of the control animals were used first in control, then in experimental groups. Thus

[1]The writer wishes to express her appreciation to Dr. D. O. Hebb under whose guidance this work was done.

more than half of the experimental animals tested at 45 and 85 days of age had had previous experience with the test procedure under conditions of satiation.

TABLE I

TEST GROUPINGS

Age	Tested with	Experimental Group	Control Group
24 days	moist Purina mash	3 males, 7 females	2 males, 7 females
45 "	moist Purina mash	3 " 6 "	1 " 4 "
45 "	milk-soaked bread	2 " 7 "	2 " 3 "
85 "	moist Purina mash	5 " 4 "	

The test procedure consisted in placing a dish of moist food in the home cage of the animal for one hour. All animals were observed for the first seven minutes after the presentation of food, and the time spent in eating during each of the seven minutes was recorded. The food was weighed after 7, 30, and 60 minutes, and then removed. The experimental groups were deprived of food for 23 hours before each testing, while the control animals had the usual supply of pellets continuously in the cage. After six such test days, pellets were replaced in the cages of the experimental groups, and the testing was continued in the same way for the next three days under satiation conditions. The animals were weighed daily before each test.

RESULTS

During the first minute after food was placed in the cage, the deprived animals did not eat consistently. Two animals did not eat at all, and the rest of the deprived group spent an average of 48 seconds eating (Table II). Even during the remainder of the hour in which food was

TABLE II

SECONDS EATING DURING FIRST MINUTE OF FIRST TEST DAY

Age	Tested with	Experimental Group			Control Group		
		M	Md	Range	M	Md	Range
24 days	mash	42	47	0–59	39	42	0–55
45 "	mash	56	59	43–60	52	56	32–60
45 "	bread	44	57	0–60	57	55	47–60
85 "	mash	60	60				

available, the deprived animals did not compensate for their physiological need since they did not maintain their weight from the first to the second day. This inadequate intake did not seem to be due to fatigue since (1) one-half of the total amount eaten was consumed during the first seven minutes, and (2) the animals' daily food had been hard pellets whereas moist food was offered in the experiment. The most striking evidence that physiological need did not control the degree of hunger aroused in the deprived animals on this first test day was the similarity in the eating time of deprived and non-deprived animals during the first minute and the total seven minutes. Table III shows this latter comparison for the 45-day-old group tested with mash; the behaviour of this group was similar to that observed in the other groups.

TABLE III

EATING BEHAVIOUR DURING SEVEN-MINUTE PERIOD ON NINE CONSECUTIVE TEST DAYS BY GROUP TESTED AT 45 DAYS OF AGE WITH MASH

Experimental Group	Deprivation						Satiation		
Seconds eating	376	402	415	416	419	419	412	416	416
Grams eaten	4.9	6.0	7.3	7.9	9.0	9.7	6.4	8.3	6.8
Control Group	Food continuously in cages								
Seconds eating	374	352	409	411	412	413	415	412	418
Grams eaten	4.6	4.5	5.3	6.4	8.7	7.0	8.9	8.5	9.8

With repetition of the procedure of 23 hours' deprivation followed by a one-hour access to food, the animals increased their rate of approach to food and the amount eaten from day to day. During the first minute after food was placed in the cage, 17 of the 37 animals ate for the entire minute on the first test day, whereas 36 of the 37 animals ate for the entire minute on the fifth test day. By the last day of testing under deprivation conditions, the experimental animals had doubled their intake relative to the first day (Table III). Despite this increase, the animals still were not eating enough to maintain their weight. After the sixth day of deprivation testing, pellets were returned to the cages of the experimental group, and the animals' eating behaviour during the one-hour presentation of moist food was observed in the same way as before. Although the animals decreased their total consumption, they still displayed a strong tendency to eat (Table III). The time spent eating and the amount eaten under these non-deprivation conditions was actually greater than that observed on the first day of testing after deprivation.

With practice in the test situation, the control animals also increased their eating time and the amount eaten (Table III). However, these changes occurred more slowly than in the experimental group.

Preliminary experiments were carried out with small groups of animals to try to determine some of the factors operating to produce the strongly sustained hunger observed under satiation conditions. Some of the variables affecting the tendency to eat under non-deprivation conditions seemed to be (1) the age at testing, (2) the age of weaning, (3) the place of rearing, (4) the kind of test apparatus used, and (5) the sweetness of the food, increased by adding saccharine.

Discussion

The behaviour under deprivation conditions clearly shows that the tendency to seek and eat food is not fully controlled by physiological need. On the first test day, the intake of the experimental animals was inadequate to maintain their weight from the first to the second day; they did not compensate for their nutritional deficit. With repetition of the test procedure, despite the fact that the deprivation period was constant, every animal increased the amount of food eaten. It seems that experience is necessary before the animals will eat an adequate amount of food; that is, a learning process increases the strength or maintenance of the hunger drive.

Further, the data suggest that the ease of arousal of hunger after deprivation is also related to past experience, since the animals began consistent eating more quickly on successive testings. In other words, practice increased the speed with which an animal selected the object appropriate to the physiological need. Past experience, then, facilitates the recognition of *what* the animal needs as well as how much he needs. This is tantamount to saying that deprivation does not necessarily arouse the tendency to seek and eat food in the animal which has never experienced deprivation. The fact that all the animals did spend some time eating on the first test day does not contradict this argument, since it cannot be assumed that there was no learning prior to testing. Even though food and water were always in the cage, an animal must have repeatedly failed to ingest a necessary substance at the exact moment when his physiological need appeared, and thus would have repeatedly experienced the deprivation conditions that would allow for the learning to eat to occur. However, it might be expected that this learning would have been minimal. The similarity in the strength of the hunger aroused in the deprived and non-deprived groups on the first day of testing may be due to this common past experience.

Under non-deprivation conditions, also, the strength of hunger seems to be related to experiential factors. The control animals increased their eating time with successive testing, or practice. The experimental animals, when tested under satiation conditions, ate more than when first tested under deprivation; clearly the hunger aroused was related more to experience than to deficit. A similar observation has been made by Young who reports that ". . . the percentage of choices of purina varied with the number and distribution of reinforcements with apparent disregard for the carefully planned periods of total deprivation"(7, p. 298). Finally, the preliminary work on eating behaviour under non-deprivation conditions also suggests that experiential factors are important in controlling hunger (for example, the age of weaning, and the environmental stimuli of the cages and the experimental laboratory).

It must be concluded, then, that the arousal and maintenance of the tendency to eat is related as much to past experience as to present need. This emphasis on the role of experience in the organization of general hunger is consistent with Young's observations on the development of specific hungers. Further, the conclusion implies that learning studies must consider the effect of experience, as well as the extent of physiological deficit, in controlling the strength of hunger.

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THE STATISTICAL ANALYSIS OF THE ROSVOLD AND MISHKIN DATA

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Summary

In the *Canadian Journal of Psychology*, September, 1950, Rosvold and Mishkin discuss the effects of prefrontal lobotomy on the Intelligence Quotient. Test scores from five patients were analyzed, and certain conclusions derived and compared with results obtained by other investigators. In the paper presented herewith a method of statistical analysis, preferred by the present authors, is put forward and compared with the Rosvold and Mishkin method.

The Rosvold and Mishkin Analysis

Six values of "t" were obtained based on the six possible differences between the four types of score, designated A, B, C, and D. Although six pairs can be selected from these four, only three of these yield independent comparisons among the four scores; it is misleading to imply that six hypotheses can be tested without indicating the connection between them. For example, any two of the following three hypotheses clearly imply the third one:

"Score A—score B has a mean value of zero,"
"Score B—score C has a mean value of zero,"
"Score C—score A has a mean value of zero."

To avoid this difficulty, attention must be confined to at most three comparisons. It would also be advantageous to have these comparisons orthogonal; consequently the analysis of variance is indicated.

In the calculation of the standard deviation to be used in the "t" tests in Rosvold and Mishkin's problem (2), four or three degrees of freedom should be used, depending on whether the missing value does or does not occur in the particular comparison. Consequently, the respective 5 per cent "t" values determining the rejection level should be 2.776 and 3.182 rather than the values given, which are the 5 per cent values for three and two degrees of freedom respectively.

Proposed Analysis

In place of the four or three degrees of freedom used in the "t" test, an estimate of error having 11 degrees of freedom is available from an analysis of variance, and should be used, provided there is no *a priori* reason to expect a lack of homogeneity in the error variance as we move from one type of score to another.

The analysis of variance presented is based on the assumption that each observed score is the sum of the following:

(i) A personal number which varies from patient to patient.

(ii) An effect varying from one type of score to another. (It is these "column" effects we wish to study.)

(iii) Superimposed on the "patient" effect + "column" effect, an observational error which we assume is independent of the particular patient and the particular column.

A possible further refinement could be made by allowing for a personal I.Q. change between the pre-morbid and morbid states, its magnitude depending on the individual patient. However, before applying this refinement, more data from the pre-morbid state would be preferable.

TABLE I

PRE- AND POST-LOBOTOMY SCORES ON "M" AND WECHSLER INTELLIGENCE TEST

Patient	Pre-Morbid Score "M" I.Q.	Pre-Lobotomy Wechsler I.Q.	Post-Lobotomy "M" I.Q.	Post-Lobotomy Wechsler I.Q.
	(A)	(B)	(C)	(D)
A.M.	120	109	110	114
A.L.	105	71	85	86
W.C.	94	90	75	87
B.P.	100	..	65	54
H.S.	102	110	95	95

Since there are three degrees of freedom in the differences among column averages, we can make exactly three independent comparisons, each with one degree of freedom. The following three comparisons are suggested by the nature of the problem. The first is between C and D and is used to test the hypothesis that these two types of score have the same mean. This test is necessary since the next two comparisons will be confounded with the mean difference betwen C and D unless this mean difference is zero. The resulting F ratio will be tested at the 5 per cent level. The second comparison is the excess of B over the average of C and D, and is used to test whether there is significant lowering of the I.Q. after the operation. We shall use a 10 per cent region with the F test and shall reject only if the comparison is positive, thus obtaining a 5 per cent level on the Null hypothesis. The third comparison is the excess of A over the average of B, C, and D, and measures the deteriorating effect of morbidity on intelligence. For this test we shall also use a 10 per cent F and shall reject only when the comparison is positive.

Table I gives the data of Rosvold and Mishkin (2), and Table II records the analysis of variance. The method described by Fisher (1, pp. 175-7) is used to take account of the non-orthogonality due to the missing observation. The numerical analysis assumes that the tests will be made in the order given above and that each test will be made only

TABLE II

ANALYSIS OF VARIANCE

Variance	d.f.	S.S.	M.S.	F	Sign	Critical F	Hypothesis
(C−D)	1	3.60	3.60	.04		4.84	Accepted
2B−(C+D)	1	34.05	34.05	.34	+	3.23	Accepted
3A−(B+C+D)	1	1014.82	1014.82	10.01	+	3.23	Rejected
Residue	11	1115.03	101.37				

if the preceding tests are insignificant. However, with only the one observation missing, the non-orthogonality is not serious and the tests could be considered as reasonably independent.

Although with the present data our conclusions are essentially unchanged, the use of the proposed analysis will, in the long-run application to similar data, give more correct decisions.

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BOOK REVIEWS

The Thought of C. S. Peirce. By THOMAS A. GOUDGE. Toronto: University of Toronto Press, 1950. Pp. xii, 360. $5.00.

THE thought of C. S. Peirce first came to the notice of the present reviewer when, on reading William James's celebrated lectures on Pragmatism which at that time were awakening academic devotees of philosophy from their "dogmatic Hegelian slumbers," he was surprised to find the distinguished psychologist giving the credit to Peirce for introducing this new philosophical doctrine. He (the reviewer) was inclined to agree with the opinion then current among his fellow students of philosophy and psychology that this tribute was little more than a generous gesture on James's part, prompted by friendly acquaintance with Peirce, Harvard graduate, son of a distinguished Harvard mathematician, and belonging to the select circle of New England scholars. This impression was strengthened by the report that such writings of Peirce as were accessible were hard to understand, abstruse, and full of dark sayings. It is true that C. S. Peirce was neglected and comparatively unknown during his own life (1839-1914). But time has redressed this injustice. Between 1931 and 1935 six large volumes of his *Collected Papers* were published, and these revealed that Peirce was a "thinker of first magnitude." Now he is almost a vogue. There has even been formed "The Charles S. Peirce Society" to promote the further study and development of his philosophy.

In the book now before us, Professor Goudge furnishes the first comprehensive and adequate treatment of the philosophy of C. S. Peirce in its systematic totality. "Systematic" is hardly the word, since Dr. Goudge stresses the fact that Peirce's writings present incompatible views on the same subject and not a few irreconcilable contradictions. In accounting for this lack of order and consistency in a thinker capable of originality and brilliance, he rejects the theory of Weiss and Feibleman that the discrepancies in Peirce's texts are due mainly to careless wording of his thought which is at bottom consistent, nor can he explain them as the result of the temporal development of Peirce's thought into a finally coherent form. Rather he adopts a third explanation on which his interpretation rests throughout, that there is a basic cleavage in Peirce's thought between his naturalism and his transcendentalism. These tendencies, he holds, spring from two sets of premises incompatible with each other but each making an irresistible appeal to Peirce's temperament and intellectual tendencies: his naturalism, the belief that scientific method, starting with observation, going on to hypothesis, and ending with inductive verification is the only means of obtaining knowledge, and that all *a priori* modes of thought, and personal and subjective categories, about matters

of fact are illegitimate; and his transcendentalism, the belief that feeling, sentiment, or instinct is a more important source of knowledge than the appeal to reason or science, and that in dealing with the origin and destiny of man, metaphysical construction, adopting *a priori* modes of reasoning and relying on highly personal and anthropomorphic categories is a more significant activity than logical analysis (5-7).[1]

Dr. Goudge devotes the larger part of his book to an exposition of Pierce's naturalism which he finds to be the more powerful and fruitful aspect of his thought. "I was brought up in an atmosphere of scientific inquiry," wrote Peirce in 1893, "and have all my life lived chiefly among scientific men" (211). Peirce's early training and occupations made him thoroughly familiar with the methods of natural science and the experimental procedures of the laboratory. When an undergraduate, he discussed advanced mathematical problems with his father, eminent Harvard mathematician, received his degree in chemistry, *summa cum laude*, and continued researches in this field intermittently for a number of years. He familiarized himself with details in other fields of scientific inquiry; astronomy, geodesy and psychology, and the evolutionary biology of Darwin and contemporary British naturalists.

In the naturalistic part of Peirce's writings, Dr. Goudge reviews with apposite and helpful comment his papers on the characteristics of scientific inquiry and the classification of the sciences, on Mathematical Inquiry, Phenomenology, Logic, and Scientific Metaphysics. Fullest treatment, in two chapters covering a hundred pages, are accorded to Peirce's writings on Logic, since this is the field in which he did his most original and significant work, the central core of his philosophy. One chapter is devoted to Explicative or Deductive Inference and General Semiotic and the other to Ampliative Inference, including induction (with sampling and probability), and abduction (explanatory hypothesis and experimental verification). Limitations of space do not permit the reviewer—were he otherwise qualified—to follow Peirce's arguments as interpreted in this field, although here his thinking is most incisive and cogent, and his views not to be disregarded by present-day students of syllogistic inference, scientific induction, and statistical method and probability.

Specific reference may perhaps be made to Peirce's views on three subjects which have an important bearing on psychological theory, namely phenomenological principles, general theory of signs, and the pragmatic criterion of truth. Only summary statements can be made

[1]The page references here given are to the book being reviewed. If specific references to Pierce's *Collected Papers* are desired, these can be found by consulting Goudge's book.

under these three heads with the hope that any readers of this *Journal* who are curious to know more about Peirce's views on any of these subjects will turn to the book being reviewed.

Since psychologists have recently been constrained by developments in their own field to admit that phenomenology, a study of the features of immediate or direct experience, is a distinctive and highly significant part of psychological science, Peirce's views on the subject have a timely interest for them. According to him, the most important question that can be asked about the field of immediate experience is whether it possesses any pervasive or universal characteristics. He finds that everything given in conscious experience exhibits three unique and irreducible features (85-95). The first (which he calls "Firstness") is characteristic *quality*, of which the familiar secondary qualities are typical, although not exclusive, illustrations. It is to be noticed that such a perceived quality is a particular, and not to be confused with its conceptual description; for example, the quality red as perceived with the concept of redness. The second "indecomposable element" in the content of direct experience ("Secondness" in Peirce's terminology), is *existence* or *actuality*; that is, the experienced item is ineluctably present before us, a determinate actuality here and now. "Secondness" is not to be confused with spatio-temporal location, but, taken together with quality, constitutes an ultimate feature of phenomena which is best designated by the word *fact*. The third irreducible feature is more complex though no less essential to the constitution of phenomenal experience. "Thirdness" is an element of *generality*. Facts as immediately experienced enable us to predict what will occur in the future. This would be impossible if they were mere particulars. Every experienced item contains some feature which links it with what is to happen and what has happened. This feature can only be an element of generality which makes it possible for us to predict, not a uniquely specific outcome, but some *kind* of an outcome. (If I perceive a stone as hard, this means that I can predict that every attempt to scratch it by moderate pressure of a knife will fail.) Generality and law are the heart of "Thirdness," the source of the meaning conveyed by symbols, and the predominant constituent of thought.

No psychologist of strong behaviourist leanings could be more impressed than Peirce by the importance of language to human thought and behaviour. It has been the major factor, he holds, in the development of mind (233-7). In fact, the continuous activity of interpreting signs *is* the reality of mind. Thinking is carried on in dialogue with oneself. Verbal symbols constitute the sole vehicle of inference and communication. Indeed, Peirce goes so far as to say: "My language is

the sum total of my*self* as distinct from my physical body." When, however, Peirce is asked point-blank whether the particular signs employed in inner dialogue *are* the thought, he answers: "Oh, no; no more than the skins of an onion are the onion. (About as much so, however.)" (237). Such views as these give Peirce's *Semiotic*, or general theory of signs, an especial relevance to psychological discussions today. Unfortunately, the Semiotic involves too great complexity and detail of classification for even the barest outline here. By 1906, Peirce had discovered that there are ten trichotomies and sixty-six classes of signs. Mention can be made of just one trichotomy which held a place of central importance in Peirce's theory, that of *Icons, Indices,* and *Symbols,* which are co-ordinate with the three phenomenological categories lately considered (142-6). *Icons* are literal images or facsimiles which have the value of exhibiting features which resemble those of an object without signifying its existence. Such are pictures, photographs, geometrical diagrams, algebraic formulae, ideographic characters—although all language possesses an iconic element. *Indices* do not resemble, rather are in existential relation to their objects, are evidence for the existence of the particular object they represent. Thus a bullet-hole is index of the passage of the bullet, a plumb-bob of vertical direction, a weather-cock of wind direction. *Symbols* provide means for knowing classes, kinds, and laws. A symbol by itself cannot indicate any particular thing, but only a kind of thing. All spoken and written words, sentences, books, etc., are symbols. The meaning of a symbol is thus a generalized object of the nature of a concept, principle, or law. But laws, that is, regularities in the way in which things are and act, are what enable us to predict the course of future events. Thus action supplies a way of testing and verifying the meaning of symbols.

The rise of pragmatism as a philosophical doctrine had definite consequences for psychological theory. Psychologists of the American "functionalist" school were adherents of pragmatism or decisively influenced by it, and the doctrine, now called "operationism," is still very much alive in psychology. In the context of his naturalism, Dr. Goudge points out, Peirce never put forward the pragmatic doctrine as a theory of truth (155). Rather, he conceives of it as a theory of *meaning,* applied to concepts, words, propositions, and other symbols. The doctrine as he interprets it affirms that such intellectual signs mean only the experimentally verifiable consequences which follow from acting on them (151-6). It insists that meaning depends entirely on operations which are public and repeatable, removes from the field of knowledge all ideas that are wholly subjective and private, and amounts to an extension of

the scientific method into philosophy. If this interpretation is correct, it would appear that Peirce (at least in his naturalistic vein) is the true forerunner of pragmatism, particularly, perhaps, of the Dewey version of "experimentalism," and that Dr. R. B. Perry overshoots the mark when he says that pragmatism is largely the result of James's misunderstanding of Peirce.[2] Dr. Goudge admits, however, that Peirce, in the transcendental aspect of his thought, links pragmatism with the attainment of the ethical ideal, the *summum bonum*.

In view of his preoccupation with the methods of natural science and his adoption of what he called the "pragmaticist" test of logical meaning, it might have been expected that Peirce's metaphysics (like the world-view of William James) would have been individualistic, pluralistic, nominalistic. Such, however, was not the case. Not "Secondness" but "Thirdness" he takes to be the key to the nature of the real universe. Phenomena, he asserts, are discontinuous so far as their existence is concerned, i.e. *qua* facts or individuals, but continuous so far as their reality is concerned, i.e. *qua* laws or generals (226). Generality is an ultimate feature of everything observable, also an indispensable ingredient of reality (97). Consequently *continuity*, another name for generality, is a fundamental category of naturalistic metaphysics. It acts as a regulative, logical principle prescribing that the only explanatory hypotheses fit to be entertained are those which are continuous, and connected with already established knowledge, and exclusive of inexplicable ultimates of all kinds. But in his speculative or transcendental metaphysics, Peirce treats continuity as a principle constitutive of the universe. Affirming as it does the dominance of unity, coherence, communication, coalescence in the world, this principle supports objective idealism, "the one intelligible theory of the universe" (277). Ideas gain generality and become welded with other ideas. "The consciousness of a general idea has a certain 'unity of ego' in it which is identical when it passes from one mind to another" (282). As Dr. Goudge explains this universally constitutive principle in its ethical application: "The view that personal existence is an ephemeral affair, and the conception of evolution as a process which is moving inexorably toward an unlimited community embodying concrete reasonableness and creative love, provide the basis for Peirce's ethics. In it, as we shall find, the evolutionary goal is equated with the *summum bonum*" (290).

While Peirce's speculative philosophy does not display the penetrating analysis and architectonic power shown in his mathematical and logical

[2]R. B. Perry, *The Thought and Character of William James* (Briefer Version, Cambridge: Harvard University Press, 1948), 281.

inquiries, it is by no means negligible in the judgment of our author who says of it: "Its speculative breadth and originality, together with its vigorous affirmation of traditional doctrines give it a distinctive place among the metaphysical constructions of occidental philosophy" (325). Peirce's doctrine of God represents, we are told, the culminating point of his transcendentalism. "God" for Peirce is an essentially vague conception of an *Ens Necessarium*, the Supreme Creator, an all-perfect Spiritual Being, a Transcendent Person, whose relation to the world is that of infinite love. How show that this conception signifies anything real? Deductive argument Peirce dismisses as useless, and natural science methods as inapplicable. As an explanatory hypothesis, it has vastly greater initial plausibility than many other deliberately formed hypotheses, but remains so vague that no determinate experiential consequences which can be put to the test, can be drawn from it. Nevertheless, it has a commanding and most beneficial effect upon the whole conduct of life of those who adopt it. The convincing consideration, Peirce concludes, is supplied by immediate perception. One can only know God by direct perception and has as good reason for belief in the living personality of God as he has for belief in his own (312-17).

A concluding chapter on Peirce's career contains a biographical sketch, with emphasis on those events and relationships which influenced the mental development and outlook of the philosopher. Peirce's mental biography is interesting in itself, throws much light on his intellectual trends and personal interests, and goes far to account for the basic cleavage between his scientific naturalism and his transcendental idealism.

Dr. Goudge has made a valuable contribution to philosophic literature in this volume of moderate length, competently written, and so judiciously arranged as to present the philosophy of Peirce as a connected whole and to exhibit its logical structure and over-all import. The magnitude and difficulty of his task is apparent when it is remembered that Peirce's thought, marked by freshness, originality, and penetration, is contained in six volumes of papers which are fragmentary, repetitious and rambling, and not infrequently contradictory. Students of philosophy, and psychology as well, will find the careful reading of this volume very rewarding. The exposition is lucid, the interpretation of particular passages helpful, and of major trends illuminating. Criticism, when applied, is drastic but constructive. The author is to be congratulated upon an excellent piece of work. In typography and binding the book is a credit to the University of Toronto Press whose imprint it bears.

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Child Psychiatry. By LEO KANNER. Second Edition. Toronto: Ryerson Press, 1948. Pp. xiii, 745. $11.50.

THIS book, now in its second edition, is a comprehensive textbook on the problems common to children who appear in child guidance clinics. It is well written, lucid, and sensible.

The book is arranged in four parts:

Part I. The history of Child Psychiatry is traced through four stages—thinking *about* children; doing things *to* children; doing things *for* children; working *with* children. It is always satisfying for a reviewer to find that he can agree more or less with an author, so I take great pleasure in quoting: "Freud, who so clearly understood the influence of earlier experiences on emotional development, had his theory of infantile sexuality all worked out and published (in 1905)—three years before he ever saw a single child professionally," and I must add that Freud then saw all too few. Hence the difficulty his satellites experience in reconciling the newer knowledge of child development to the outworn psychoanalytic dogma.

Part II. Kanner calls this part "Basic Orientation." After a rather fuzzy introduction on the genesis of the emotions he states his fundamental thesis that most of the mental ills of children arise from inadequate parent-child relationships. On page 131 is a table indicating the ideal relationship—acceptance and affection, and three undesirables—overt rejection, perfectionism, and overprotection. In one or another form these three appear throughout the book as explanatory principles.

Part III. Clinical consideration. Kanner discusses the confused state of the field with reference to nomenclature and advocates a simpler vocabulary. He believes that parent education is the most effective means of prevention.

Part IV. Phenomenology. In this section all types of problems presented by children are fully discussed. These chapters are adequately documented, usually with type cases reported more or less in detail. Treatment is suggested in each instance. An example of the clear cut methods he suggests is indicated in his discussion of "tics." "Not the tics must be treated but the patient who has them. The more the child's attention is directed towards the movements . . . the less are they likely to disappear. This is why parental admonitions, nagging or warning do not result in improvement." Again when discussing enuresis he states: "The main features of all these accessory methods is the strengthening of the child's self-reliance in an atmosphere of freedom from punitive and otherwise hostile practices, from pseudomedical notions and from anxieties superimposed on the enuresis." Stuttering, he claims, arises under the influence of parental attitudes, "particularly rejection and perfectionism."

His treatment of the role of fear in childhood is exceptionally good. "There is a normal, justified and biologically indispensible form of fear" he points out, something all parents, especially the male, should keep in mind. His chapter on delinquency is not very conclusive. His interpretation of statistics is just as faulty as everyone else's, owing, of course, to the atrocious carelessness with which reports on juvenile delinquency are prepared and published. Schizophrenia, hysteria, hypochondriasis are adequately treated and given their proper place in this field, that is, secondary to other more commonplace problems, which, because of their frequency are more important to deal with.

The book is well documented; each chapter has a bibliography appended. Perhaps a little too much emphasis is placed on European authors whose progress in child psychiatry lags far behind the work on this continent.

This is altogether a very refreshing approach to a subject which is usually dealt with far too mysteriously, with the panoply of superstition and secret rites. After all, children are more simple beings than adults. What little we know of children, as this author proves, can be discussed in a straightforward manner. What we *don't* know, which would fill many books equal in size to the one reviewed, can be left out entirely. This author has so done, for which forbearance we should thank him.

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Proceedings of First Annual Meeting, Industrial Relations Research Association, December 29-30, 1948. Edited by Milton Derber. Champaign, Ill: The Association.[1]

The Industrial Relations Research Association is a new organization. At the annual meeting of the American Economic Association in January 1947, some 30 labour economists got together and discussed the possibility of establishing a learned society in the field of industrial relations. In October of the same year the Constitution and by-laws of the new society were adopted and officers were elected. At the end of their second year, on October 1st, 1949, they published a membership directory in which 1586 persons were listed. In view of the fact that it is the purpose of the Association to make "a more balanced study of the human factors in industrial relations," it is to be regretted that academic psychologists constitute but three per cent of the total membership.

The *Proceedings of the First Annual Meeting* cover a wide range of

[1]Also received: Proceedings of the Second and Third Annual Meetings, 1949 and 1950.

topics. All of them are of some interest to psychologists engaged in industrial work. But the paper by Professor Arthur Kornhauser of Wayne University, on "The Contribution of Psychology to Industrial Relations Research" deserves particular mention in a psychological journal. In discussing the place that psychological theory could hold in industrial relations research, he writes: "Industrial relations thinking has been carried on for the most part within a framework provided by economic theory plus the common sense ideas of the practical man. Psychology brings somewhat different conceptual tools and orientation that should prove suggestive in evoking new research ideas and in guarding against over-simplifications arising from neglect of significant factors." He describes briefly seven representative sets of problems to which psychologists have addressed themselves: (*a*) *Matching men and jobs*; (*b*) *Methods and conditions of work*; (*c*) *Attitude studies—labour and management*, in which he questions the conclusions drawn by some psychologists that wages are relatively unimportant in job satisfaction; (*d*) *Clinical studies*, where he suggests that a collection be made of instances where clinical psychologists have succeeded or failed in building team-work and improving industrial relations through producing personality changes in top executives; (*e*) *Group dynamics*, which includes group therapy as attempted by the Tavistock Institute; (*f*) *Employer-employee communications*, which, in the opinion of the reviewer, could have been developed further; and (*g*) *Public opinion*, or the study of the attitudes of the public outside of labour and management circles.

We agree with Dr. Kornhauser that many psychologists have avoided the large, intricate and amorphous questions so typical of inter-personal and inter-group relations in the real world, and have often contented themselves with applying rigorous research methods to constructing batteries of serviceable employment tests. However, this narrow viewpoint is being abandoned. It is good for graduate students and for young practising psychologists to become conversant with the techniques of testing, merit rating, attitude surveys, and the like. But it is even more important, in our opinion, that they read extensively the works of the outstanding psychological theorists, such as Kurt Lewin and others, of pioneers in the scientific method applied to human affairs, such as Korzybski, of economists, sociologists, and students of administration. This will give them a broader and more realistic view of the field in which they are expected to offer a contribution. The book under review is valuable for this purpose.

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Textbook of Abnormal Psychology. By CARNEY LANDIS and M. MARJORIE BOLLES. Toronto: Macmillan Company, 1950. Pp. x, 634. $5.00.

As the authors point out in the preface, the need to revise this book five years after the first edition is an encouraging sign of progress in the field of abnormal psychology. This need has arisen largely because of the vast amount of new research publications in the post World War II period.

The length of the book has been increased by ten per cent. The number of chapters remains the same, but sequence of topics has been changed somewhat, and the organization of the book has been improved by dividing the book into five sections: (1) Orientation, (2) Varieties of Abnormality, (3) Explanations, (4) Psychopathology, and (5) Diagnosis and Therapy. The material in the last section of the book has been revised considerably, and brought up to date. In this section, the chapter on Psychodiagnosis (covered in the chapter on Medical Psychology in the first edition) presents a fuller account of the projective techniques. Rorschach and TAT are presented in greater detail, and a description of the Rosenzweig Picture-Frustration Test has been added. Psychotherapy is dealt with in two chapters, one by that title, and another essentially new one entitled, "Educational Guidance and Counseling," which includes an account of Rogerian non-directive counselling.

This text is probably unrivalled in its solidity. The close tie-up between statements in the text and excellent source material is unusual in a book of this kind. Citation of references in the text encourages the student to go to the primary sources for further information, and the eclectic approach forces the serious student to draw his own conclusions from the data. Where the data seem particularly clear to the authors (as in the case of Kallmann's genetic studies of schizophrenia, and also with respect to the experimental findings of the Columbia-Greystone project), the reader achieves something approaching "closure." But more often, the reader is left to make up his own mind. The encouragement of independent thinking which this eclecticism fosters in the student is admirable in most respects.

But, in this reviewer's opinion, there are some issues on which the authors might have taken a much stronger stand. For example, on page 108, there is this statement: "Whether future research will show that neurosis has a physiological rather than a psychological basis is completely speculative"; and again, on page 82, neurotics and psychotics are referred to as "sick people without a physical basis for their illness." Failure to deal consistently with the mind-body problem appears to be a dangerous weakness in this book. It appears probable that, in this

instance, the authors' failure to provide the tender reader with guidance in the form of sound monistic theory, may result in his being led directly into animistic thinking.

However, the weaknesses of the book are unquestionably small in comparison with its strong merits, and when supplemented by lectures dealing with important theoretical considerations, it should continue to be one of the best texts for both undergraduate and graduate courses in Abnormal Psychology.

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Annual Review of Psychology. Edited by C. P. STONE and D. W. TAYLOR. Stanford: Annual Reviews, Inc. Vol. I, 1950. Pp. ix, 330. Vol. II, 1951. Pp. ix, 389. $6.00 each.

THESE are the first volumes of a yearly publication. The programme is under the direction of "an Editor, an Associate Editor and an Editorial Committee composed of five pyschologists representing in interest and familiarity as many special fields of psychology as possible." Eighteen fields were reviewed in Volume I. These were Growth, Development, and Decline; Learning; Vision; Hearing; Somethesis and the Chemical Senses; Individual Differences; Personality; Social Psychology and Group Processes; Industrial Psychology; Animal and Physiological Psychology; Abnormalities of Behaviour; Clinical Methods: Psychodiagnostics; Clinical Methods: Psychotherapy; Educational Psychology; Counseling Methods: Diagnostics; Counseling Methods: Therapy; Statistical Theory and Research Design; Problem Solving and Symbolic Processes.

The selected authors were instructed to limit their coverage largely to publications appearing during the preceding twelve months and were advised to adopt an interpretive and evaluative approach to the literature selected. The excellence of the *Review* is guaranteed by the fact that the editors can be assumed to have secured the services of undoubted experts in the selected fields. These *Reviews* should keep psychologists abreast of developments over a wide area of psychological interest.

The 1951 volume has also been received. The topics coincide with those of the 1950 volume except for the fact that Growth, Development, and Decline; Animal and Physiological Psychology; and Problem Solving and Symbolic Processes are replaced by Child Psychology; Comparative and Physiological Psychology; and Gerontology.

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Values and Personality. An Existential Psychology of Crisis. By WERNER WOLFF. Toronto: The Ryerson Press (Grune and Stratton), 1950. Pp. x, 239. $5.75.

WERNER WOLFF's most recently published book (his ninth during the past seven years) deals with the theory and practice of his own kind of "psychoanalysis." The major portion of this book consists of extracts from notes which the writer took during analyses of two patients: a German man of 50, and a Spanish girl of 20. The reader gains the extremely interesting experience of following the high points of these one-year analyses from beginning to end. Wolff departs from orthodox psychoanalysis in that he substitutes his own "existential" theory for Freudian theory of psychopathology.

Wolff's existentialism should not be confused with that of Wundt or Titchener. In fact, Wolff denies that there is any historical precedence for his use of the term, and states: "Existence is here used in the exact sense of the word, which derives from the Latin *existere*, meaning to step out, to emerge." (In the glossary, existential is defined as "that which challenges our existence".)

In both theory and practice, Wolff stresses the importance of the "primary scene." In practice, the "primary scene" is identified in each case as the patient's earliest memory. Once identified in this way, this primary scene is inferred to be "a traumatic experience of early childhood which acts like a magnet in that it continuously attracts new experiences with which to enforce this sustained action." For the "existential psychotherapist," knowledge of the primary scene is one of the most important keys to his interpretation of the patient's symptoms. Dreams, too, are relied on very heavily in the usual analytic way to reveal unconscious mechanisms.

Wolff's theoretical concepts are so much part and parcel of the particular cases in his book that it is very difficult to deal with the concepts apart from the cases. This reviewer found the therapist's notes highly illuminating in certain respects, but could not follow the author's extrapolations to general behaviour theory. Why should a readily accessible childhood memory (the "primary scene") be the key to the interpretation of a neurosis? Wolff's main hypothesis appears to be that major personality change occurs suddenly, in relation to a single event. The evidence adduced in support of this principle was not strong enough to be convincing to this reviewer.

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